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The Impact of Human Capital on Shadow Economy in Indonesia

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Abstract

Shadow economy is a market for legal and illegal goods and services that escape recording and estimation of GDP. It can cause inaccurate estimation of GDP, declining tax revenue, and less precise economic policies. Improving the quality of human capital, both in education and health dimensions, can reduce shadow economy. The research aims to estimate shadow economy and analyze the influence of the quality of human capital on shadow economy in Indonesia. Applying time series multiple linear regression analysis, the findings show that the average shadow economy in Indonesia is 28.97 percent, changes in life expectancy negatively affect changes in shadow economy, while changes in the gross participation rate of tertiary education have a positive effect.

Keywords: shadow economy; government expenditure; the quality of human capital; multiple linear regression; time series

JEL classifications: H500; I150; I250; O420

1. Introduction

Recording economic activities is vital for the government to monitor economic performance and development of a country, enabling the government to evaluate whether or not the economic policies they've implemented are working accordingly. In practice, however, not all economic activities are recorded or noticed by the government. Those unrecorded activities are commonly known as shadow economy or underground economy.

Smith (1994) defines shadow economy as market-based production of goods and services, whether legal or illegal, that escapes detection in the official estimates of gross domestic product or GDP. According to Schneider, Buehn & Montenegro (2010), shadow economy can be categorized into legal and illegal economic activities and can also be categorized based on monetary and non-monetary transactions. The legal part is intentionally hidden by

the practitioners to avoid tax, retribution, complicated administration and other fees, as frequently seen in informal economic sectors to which most of home-industries belong. Meanwhile, the illegal part is basically other economic activities that are against the law, e.g. gambling, fraud, prostitution, illegal-drug trade, human trafficking, etc., therefore, obviously hidden from the government or when not, is deemed unethical to be taken account into GDP.

The existence of shadow economy in a country, to some degree, can help reducing unemployment by absorbing the working age into home-industries that are mostly labor intensive. In a bigger scale, however, shadow economy can be troublesome, supposing it is not handled correctly. The more economic activities go unrecorded, the more potential tax revenue is wasted, hence less income for a country. Shadow economy can also cause unpredictability in the economy of a country, rendering it even harder for the government to implement the right policy to achieve economic goals or avoid economic disasters. Therefore, the level of shadow

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economy within a country, ideally, should be kept low and, at some point, the activities within should be converted into formal and recorded economic activities (official economy) to maximize the country's tax income.

Previous studies show high shadow economy level among developing countries. For example, Hernandez (2009) discovers that shadow economy in Peru is around 44-50 percent of the whole economy, while Nhavira (2015) discovers an even more staggering percentage of shadow economy in Zimbabwe, namely almost 60 percent of its whole economy in 2013, or a jump from 40 percent in 1980. Indonesia is no exception, since several figures indicate that shadow economy might have a significant proportion in the whole economy. According to Statistics Indonesia (*Badan Pusat Statistik* or BPS) (February 2010), there are up to 73 million workers in informal sectors, or around 68 percent of labor force in Indonesia. Myers (2014) finds that Indonesia has the highest number of business units included in shadow economy compared to several developing countries in the world. Myers also states that for every 1 business unit recorded, 130 business units are not. Previous studies conducted by Schneider, Buehn & Montenegro (2010) show that within 1999–2005 period, shadow economy in Indonesia constitutes up to 19.5 percent of the whole economy. Meanwhile, Manurung (2015) has similar findings that shadow economy in Indonesia amounts to 18.48 percent in average of its economy within 1984–2014 period.

Lack of skill and education might be one of the issues that contribute to the high figure of Indonesia's workers in informal sectors as part of shadow economy. As shown in the data by Statistics Indonesia from the same year, more than 50 percent of 108.2 million people of working age population in Indonesia that year only has educational background of primary school level. The low education level will hinder those in working age population to enter the formal sector as higher educational requirements might be applied by many employers. Therefore, those who cannot enter formal sectors might have

to dwell in the informal sectors or even worse, in illegal economic activities.

Solow and Swan model extends the Harrod-Domar economic growth model by taking into account the level of productivity that later is divided into Multifactor Productivity and Average Labor Productivity, an attempt to quantify the quality of human capital. The quality of human capital in that model can be categorized into two main categories, namely education and health, as stated by Todaro & Smith (2003). Since the introduction of Solow-Swan model, many studies have been conducted based on the model to observe the impact of the quality of human capital on economy. Most of the findings, including that by Grossman (1972), Becker (2007), and Elmi & Sadeghi (2012), support the model and call for a positive impact. They discover that improving the quality of labor or human capital will increase the economic growth of a country.

Those studies were carried out to observe the impact of the quality of human capital on the recorded economic indicators, therefore those findings are true for the recorded economy. However, the impact of the quality of human capital on the unrecorded economy or shadow economy is yet to be determined. Several previous studies show that improvement in the quality of human capital might be one of the solutions to reduce shadow economy and at the same time provide a positive impact on official economy. Theoretically, the better the quality of human capital, the better the chance of the workers to enter formal sector and the better the understanding of the importance of reporting their economic activities and paying taxes. However, there are also studies with contrasting results, indicating that the impact on shadow economy may be different in each country and in different condition. Therefore, this paper aims to calculate the scale of shadow economy in Indonesia within the time span of 1981–2014 and investigate the impact of the quality of human capital on it.

2. Literature Review

Previous studies have attempted to estimate the scale of shadow economy within a country. Alderslade, Talmadge & Freeman (2006) proposes two approach: direct and indirect methods. The exact direct method is to conduct direct census to calculate the unrecorded activities, a futile attempt considering the nature of shadow economy that intentionally hides their activities due to various aforementioned reasons. Therefore, the direct method focuses on using tax or fiscal audits. Mogensen (1985) finds that the disadvantage of the direct method is that the fiscal audits might not be representative to the population of shadow economy as there are many illicit activities that are usually not even found by fiscal agents.

Another way to estimate the scale of shadow economy is using indirect methods. The indirect methods seek to estimate shadow economy by measuring discrepancies in relating indicators. Kaufmann & Kaliberda (1996) attempt to measure the overall economic activities (official and shadow economy) using electricity consumption, and then by subtracting the official GDP from this, they derived an estimation of shadow economy. However, not all activities within shadow economy require electricity, hence only small part of shadow economy will be detected through this method. Another weakness is that this method doesn't take into account the change in efficiency of electric use that might vary across countries and over time.

Another popular and relatively new indirect method to estimate shadow economy is the MIMIC (Multiple Indicators, Multiple Causes) method. This method examines the relationships between latent variables of shadow economy that are divided into causes and indicators variables. This method provides a more complex dimension in estimating shadow economy by taking various kinds of variables into account. Helberger & Knepel (1988) argue that the model estimations using this method lead to unstable coefficients as subject to the sample size. Another criticism towards this method lies in the

determination of the latent variables to use to comprehensively depict shadow economy and the intricate nature of the benchmarking procedure required in this method. In addition, which benchmarking method is the best and most reliable remains unclear.

The most used indirect method is the currency demand approach. Cagan (1958) proposes a model of estimating currency demand by considering the relationship between currency demand and fiscal pressure. The model is later developed by Gutmann (1977) and Tanzi (1983) to study and estimate shadow economy due to the strong relation between fiscal pressure and shadow economy. This method has been widely used to estimate shadow economy across countries because it provides a way to estimate shadow economy in its broad definition. This approach assumes the use of cash in transactions to avoid official records, covering both the legal and illegal sides of shadow economy. This approach also soars in popularity because the variables used are macroeconomic indicators that are relatively easy to access and available for most countries, even for developing countries.

Hernandez (2009) uses the currency demand approach with the model proposed by Cagan (1958) to estimate the size of shadow economy in Peru. The variables used include GDP, deposit interest rates, and inflation. As for fiscal variables, Hernandez separates tax and government expenditure to avoid multicollinearity and instead constructs two different models to compare them. The research by Hernandez shows an upward trend in the proportion of shadow economy of Peru to its economy with size ranging from 44 to 50 percent within 2000–2005 period. The calculation using tax as a fiscal variable shows a higher level of shadow economy than using government expenditure as a fiscal variable with Johansen Cointegration modeling method, while the opposite result occurs when ADL modeling method is used without any further explanation of what might have caused the differences. However, the results using Johansen Cointegration modeling show lower figures than ADL modeling and

closer figures to that shown by previous studies in Peru.

Ariyo & Bekoe (2012) also use currency demand approach to estimate the size of shadow economy in Nigeria during the period of 1975 to 2010. Their study aims to measure the size of shadow economy in Nigeria and the extent of its impact on tax avoidance. The variables used in obtaining the model in this study are tax to GDP ratio, GDP per capita, household consumption, inflation rate, interest rate, education level, and the percentage of people living in non-rural area. The result shows that the size of shadow economy in Nigeria ranges from 42.5 to 79.3 percent with an upward trend during the said period. However, despite using education as a variable in the currency demand model to calculate shadow economy, this study does not further observe its relationship with the size of shadow economy.

A study conducted by Nhavira (2015) to estimate the size of shadow economy in Zimbabwe finds that the size has increased from 40.3 percent of the economy in 1980 to 60 percent of the economy in 2013 or around 5 billion Zimbabwe dollars jump. This study uses ratio between M1 and M2 as the dependent variable in the currency demand model, while the independent variables are tax to GDP ratio, deposit interest rates, real interest rates, GDP growth per capita, GDP, and government expenditure. However, the calculated size of shadow economy in this study seems to fluctuate and negative figures are revealed in several years reveal without explanation. Furthermore, the study does not attempt to present any plan to reduce the size of shadow economy.

Berrittella (2013) conducts a research to observe the impact of public spending on education on shadow economy in 162 countries in the period of 1999 to 2006. The variables used in this study include government expenditure on education and the percentage of educational attainment of adult population for primary, secondary and higher levels of education. The study shows a negative impact of educational variables on shadow economy, or

in other words, the improvement on education can reduce the size of shadow economy. However, the use of government expenditure on education seems to merely cover public schools, while enrollment level in public and private schools across those 162 countries may vary.

Buehn & Farzanegan (2013) study the effect of educational variables and the quality of government institutions on shadow economy across 80 countries. It uses enrollment rate for secondary education, illiteracy rate for people in 15 to 24 years old age group, and quality index of political institutions. The result shows a positive impact of educational variables on shadow economy when the quality index of political institution is low. The educational variables used in this study seem to concentrate merely on young population, judging by the level of school and age group chosen, while one can argue that the practitioners of shadow economy may be older or even younger as the activities are hidden from law or any regulation concerning working age.

Salahodjaev (2015) carries out a similar study across 158 countries from 1999 to 2007. Salahodjaev uses Intelligence Quotient (IQ) score as an educational variable to examine the impact on the level of shadow economy. The study shows that on average, an increase in IQ score by one standard deviation will reduce shadow economy by 8.5 percent of GDP, supporting the findings by Berrittella (2013). However, IQ score is not a suitable measure of education level, but rather an approximation towards the intelligence of an individual that can both affect and be affected by education level. Improving IQ score is an abstract and thus not a concrete step than improving school enrollment or participation rate. Therefore, it will be difficult to implement this result into a real policy.

Previous studies by Cervellati & Sunde (2009), Weil (2013), and Elmi & Sadeghi (2012) attempt to examine the impact of health dimension on economy or economic growth. Cervellati & Sunde (2009) and Weil (2013) use life expectancy as a health variable while Elmi & Sadeghi (2012) use government spending on health as a health variable. Even

though these studies are not conducted to observe the impact of health variables on shadow economy, they are useful to observe what variables to be used to represent the quality of human capital from health dimension.

The aforementioned studies by Berittella (2013), Buehn & Farzanegan (2013), and Salahodjaev (2015) attempt to examine the impact of the quality of human capital from education dimension on shadow economy. However, they do not include health dimension that is also part of the quality of human capital. These studies are also conducted across multiple countries instead of specific to a certain country, and the impact may vary from one country to another depending on job availability, tax morale, political situation, and others. Therefore, it will be interesting to observe how the quality of human capital, both from education dimension and health dimension, will impact the size of shadow economy on a specific country as well as try to reflect on the actual situation in that country.

Several previous studies concerning shadow economy have been conducted specifically in Indonesia. Manurung (2015) estimates the size of shadow economy and observes its relation to tax tariff in Indonesia, Nizar & Purnomo (2011) attempt to measure the tax potential of shadow economy in Indonesia, Panjaitan (2007) attempts to estimate the size of shadow economy in Indonesia using changes in tax burden, tax system, and government contribution, while Samuda (2016) examines the potential tax loss as a result of shadow economy in Indonesia. Even though all these studies have been carried out in Indonesia specifically, their interest circles around the impact of shadow economy on the whole economy or on tax income of Indonesia. None of these studies attempts to find the aspects that will impact the size of shadow economy.

Therefore, this study attempts to estimate the size of shadow economy and observes the impact of the quality of human capital in Indonesia specifically, using variables from both education dimension and health dimension. Hopefully, this will provide not only an estimation of the size of shadow economy

in Indonesia, but also an explanation on actions to take to reduce or improve the situation of shadow economy in Indonesia. By conducting this study specifically in Indonesia, the result will hopefully also show connection that can be reflected in the actual situation in Indonesia, in term of political situation, tax regulation, economic condition, and human capital situation.

3. Method

Smith (1994) defines shadow economy as a market of goods and services, whether legal or illegal, that are unaccounted in GDP estimation. To calculate the scale of shadow economy, Alderslade, Talmadge & Freeman (2006) proposes two methods: direct and indirect methods. Direct methods involve direct census or calculation of the unrecorded activities, a method that will be unlikely to conduct as most of the activities are intentionally unrecorded, whether illegal or attempting to avoid paying tax. Therefore, indirect methods will be an obvious choice in the attempt of calculating shadow economy.

One of the most used indirect methods is the currency demand approach, first introduced by Tanzi (1983). The currency demand approach assumes that the transactions within shadow economy are conducted using real money or cash, because cash circulation is difficult to trace rather than digital banking platforms. Therefore, the practitioners of shadow economy will prefer cash to avoid tracing by the government, tax agent or law enforcement. As a result, the more shadow economy activities occur within a country, the higher the demand for currency or cash to conduct a transaction. Schneider & Ernste (2000) add that shadow economy is a direct result of changes in regulations by the government as well as complexity in tax system and tax burden. Therefore, by examining the discrepancy of demand for currency in different tax and government situation, we are able to estimate the size of shadow economy. The currency demand approach examines the

discrepancy of currency demand during minimum fiscal burden and the application of fiscal burden.

The currency demand approach has been widely used to estimate shadow economy in previous studies and across countries. This approach seems to fit well, especially for developing countries. It will also fit in the economic scene of Indonesia, as cash is still widely used and preferred especially during the period this study has taken interest on. The required data during that period are also available in Indonesia with choices of variables to observe to fit best to the model. Since this study examines only one country, specifically Indonesia, it will be treated in time series manner with a period from 1981 to 2014, resulting in $t = 34$ that is sufficient to infer conclusion from.

The first step to currency demand approach is to generate the currency demand model derived from the function introduced by Cagan (1958). The function suggests that the total money demand is a function of fiscal variables (θ), income variables (Y) and monetary variables (γ), as shown below:

$$C_T = f(\theta_i, Y, \gamma_i) \quad (1)$$

In order to ensure the compatibility of this function to the purpose of calculating shadow economy, the fiscal variables used are motive variables for shadow economy, such as government expenditure, tax rate, or tax revenue. Y denotes income variables that will impact the level of transaction in economy, such as real GDP, disposable income, and household consumption. Meanwhile, γ_i denotes monetary variables that will represent the opportunity cost of holding cash, such as inflation rate and interest rate.

Once the model for the currency demand has been generated, the next step is calculating the total money demand (C_T) and legal money demand (C_L). The relationship between them is stated as below:

$$C_T = C_L + C_H \quad (2)$$

The equation states that C_T or total money demand

is the total of money demand for legal and recorded transactions, i.e. legal money demand or C_L and the total of money demand for shadow economy transactions, i.e. hidden money demand or C_H . While the data for C_T is available, we have to count the C_L based on the currency demand model that has been generated by setting the fiscal variables (θ) to minimum or zero (θ_{\min}).

Afterwards, by subtracting C_L from C_T , we obtain hidden money demand (C_H), or the money used in shadow economy. The formula is as follows:

$$C_H = C_T - C_L \quad (3)$$

By obtaining hidden money demand (C_H), we can estimate the size of shadow economy symbolized by Y_H by multiplying hidden money demand with the velocity of money. The relationship is stated as follows:

$$Y_H = v_H \cdot C_H \quad (4)$$

The velocity of money in shadow economy or v_H , according to the currency demand approach, is assumed equal to the velocity of money in recorded economy or v_L . Thus, the velocity of money is expressed as follows:

$$v_H = v_L = \frac{Y_L}{C_L} \quad (5)$$

Therefore, we can calculate the velocity of money by dividing the recorded GDP by the legal money demand and use it to calculate the size of shadow economy for each respective year.

Based on that currency demand model by Cagan (1958) and other previous studies, the model that we propose for the currency demand model in this study is as follows:

$$C_{Tt} = \beta_0 + \beta_1 \theta_t + \beta_2 Y_t + \beta_3 \gamma_t + \varepsilon_t \quad (6)$$

In which C_{Tt} is total currency, θ_t is fiscal variables, Y_t is income variables connected with level of transaction, γ_t is opportunity cost of holding cash variables and ε_t is the error term of the model. The model will be gained using time series multiple

linear regression and tests for assumptions and model fitting will be carried out prior to presenting the model that will be used further.

As previously mentioned in introduction, shadow economy may have a negative impact on the economy of a country, and therefore will be better to be kept low. Researches have been conducted to investigate the impact of the quality of human capital on shadow economy. Beritella (2013) uses expenditure on public education to investigate the impact of education on shadow economy, resulting in a negative impact. Meanwhile, Buehn & Farzanegan (2013) find a positive impact on shadow economy from higher education levels.

This study will also attempt to observe the impact of the quality of human capital on shadow economy in Indonesia. Thus, a regression will be applied with shadow economy acting as the independent variable and the variables of the quality of human capital as the dependent variables. The quality of human capital will be divided into education dimension and health dimension. The proposed model is as follow:

$$Y_{Ht} = \beta_0 + \beta_1 HE_t + \beta_2 ED_t + \varepsilon_t \quad (7)$$

Y_{Ht} symbolizes shadow economy, HE_t symbolizes health dimension, ED_t symbolizes education dimension and ε_t is the error term of the model. The model, similar to the currency demand model, will be gained using time series multiple linear regression, while tests for assumptions and model fitting will be carried out prior to presenting the model that will be used further. This model does not try to suggest that the variables of human capital are able to explain or impact shadow economy. There are other variables that will explain or impact shadow economy as well. However, since this study focuses on the impact of the quality of human capital, those variables are neglected from this model. Hence, a high R-square is not expected.

The data used in this study are secondary data, all of which are time series data of Indonesia during the period of 1981 to 2014 obtained from various

sources. To further discuss about the data used in this study, the data will be divided into two sets, the first set are the data used in the currency demand model to estimate shadow economy and the second set are the data used to observe the impact of the quality of human capital on shadow economy in Indonesia.

The first set of the data for the currency demand model will be used to fit the model proposed in equation (6). The initial data used on building this model are as follows: total money demand (C) is used as the dependent variable, and for the independent variables, government expenditure (G) and national tax income (T) are used to represent fiscal variables (θ_t), real GDP (GDP) and household consumption (CONS) are used to represent income variables (Y_t), while inflation rate (i) and deposit interest rate (r) are used to represent the opportunity cost of holding cash variables (γ_t). However, during the modelling, several variables have to be dropped from the model to satisfy the modelling assumptions needed and to acquire the best fitted model that still represent the three variables (θ_t , Y_t , γ_t). The final first set of data used are as follows:

1. Total money demand (C), is the total currency or cash hold by the population or the total currency in circulation. The data used are in billion rupiah and acquired from the Monetary Statistics Publication (*Statistik Keuangan Indonesia/SEKI*) provided by Central Bank of Indonesia.
2. Government expenditure (G), is the total realization of expenditure by the government (not including transfers to regions), used in this model to represent fiscal variables (θ_t). The data used are in billion rupiah and acquired from the Monetary Statistics Publication (*Statistik Keuangan Indonesia/SEKI*) provided by Central Bank of Indonesia.
3. Household consumption (CONS), is the total expenditure of all households within the country including non-profit institutions that provide durable and/or non-durable goods and services that can be used collectively by house-

hold members, used in this model to represent income variables (Y_t). The data used are in billion rupiah and acquired from International Financial Statistics (IFS) publication.

4. Deposit interest rate (r), is the annual average of the interest rate from putting deposit in banks, used in this model to represent the opportunity cost of holding cash variables (γ_t). The data used are in percentage and acquired from International Financial Statistics (IFS) publication.

The second set of the data to observe the impact of the quality of human capital on shadow economy will be used to fit the model in equation (7). The data used as the independent variable is shadow economy (Y_H) in Indonesia, previously estimated using the currency demand approach in this study. The dependent variables are the variables that will represent the quality of human capital in terms of education dimension and health dimension. Despite the intention to obtain a beneficial result in policy making, this study decides not to use government expenditure on public health and/or education as it is heavily influenced by national tax income that makes it also an indirect impact from shadow economy. Thus, the second data set used are as follows:

1. Annual shadow economy (Y_H), is the total added value from activities within shadow economy in Indonesia. The data used are in rupiah, acquired from this study using currency demand approach.
2. Life expectancy at birth (AHH), is the number that indicates the average of total years a new born is expected to survive or live. The data used are in years, acquired from publication by World Bank.
3. Gross enrollment ratio (APK1, APK2, APK3), is the ratio of total participation, regardless the age, to the total population in the group age of the education level respectively. Primary education level is 6 to 12 years old (APK1), secondary education level is 13 to 17 years old (APK2) and tertiary education level is 18 years old and older (APK3). The data used for APK1,

APK2 and APK3 are acquired from publication by the World Bank.

4. Results and Discussion

In an attempt to calculate shadow economy in Indonesia from 1981 to 2014 using currency demand approach, we generate the currency demand model using total money demand (C) as the dependent variable and government expenditure (G), consumption ($CONS$), and real interest rate (r) as the independent variables. Using significance level of 5 percent, those variables are stationary at first difference, therefore the model will be estimated at first difference. The model generated is as follows:

$$\widehat{d(C_{Tt})} = b_0 + b_1d(G_t) + b_2d(CONS_t) + b_3d(r_t) + e_t \quad (8)$$

Table 1. The Results of the Currency Demand Model

Variables (1)	Coefficients (2)	Probability (3)
Constant	1,793.1718	0.2613
d(G)	0.1127	0.0000
d(CONS)	0.0277	0.0025
d(r)	-590.6077	0.0111
R-squared	0.80009	
Prob(F-statistic)	0.00000	

This model fulfills all the assumptions needed at significance level of 5 percent while R-square is at 80 percent. All the independent variables are proven significant at significance level of 5 percent in this model and showing direction of impacts in accordance to economic theory. Therefore, this model is fit to be used further in this research.

Using the currency demand model, the total money demand and legal money demand are calculated. By subtracting both, the hidden money demand is derived, later multiplied with the velocity of money to estimate shadow economy level in Indonesia. Even though the result from this estimation is in billion rupiah, shadow economy is usually stated or presented as proportion of the economy. Figure 1 is the estimated shadow economy level in Indonesia.

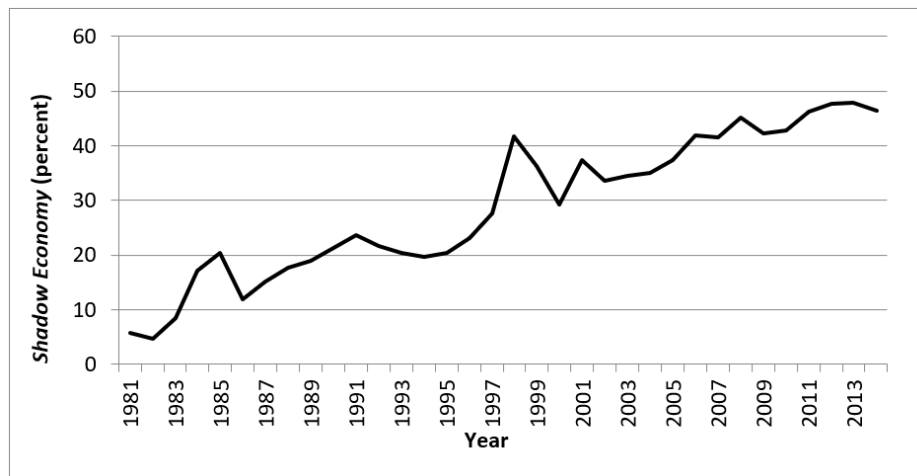


Figure 1. The Percentage of Shadow Economy to the Economy of Indonesia from 1981 to 2014

Source: the estimation of shadow economy

The estimation shows that shadow economy in Indonesia has a fluctuating positive trend. On average, shadow economy in Indonesia from 1981 to 2014 is at 28.9 percent of the whole economy of Indonesia, quite high but relatively normal in developing countries where informal sectors hold an important role in economy. This number means that more than a quarter of economy of Indonesia is unrecorded. Should we look into Indonesia's tax ratio to GDP, the World Bank records that it is still at 10–12 percent from 2010 to 2014, considered low even among other developing countries in South East Asia. Thailand, for example, has reached 17 percent in 2014, while Philippines and Vietnam are at 14.4 and 13.8 percent respectively. Shadow economy may be an explanation on why Indonesia's tax ratio to GDP is still low. When these economic activities are unrecorded or unnoticed by the government, they are essentially free from tax and other retributions, or commonly known as tax evasion. Therefore, it is important to keep shadow economy level at low level and eventually push it to shift towards legal and official economy. Thus, they can be a huge boost to the tax revenue of Indonesia.

In 1998, there is a significant increase in shadow economy level in Indonesia, jumping from 27.6 percent in 1997 to 41.7 percent in 1998. It can be explained by the Asian monetary crisis during that

period. During and following the crisis, a great number of business in formal sectors went bankrupt and had to lay-off their workers. However, household consumption during that time remained high and increasing, indicating that people were seeking activities within shadow economy to survive from the impact of that crisis, hence the increasing practice in shadow economy.

The level of shadow economy in the years following the crisis was decreasing almost to the level prior to the crisis, showing the effort of the government to stabilize the economy. Industries were developing anew, opening up job opportunities and absorbing labors again. However, issues re-occurred in 2001, when shadow economy level rose to 37.4 percent of the economy. In that year, new tax laws and regulations were introduced and implemented, including Law No. 16 of 2000 regarding General Provisions and Procedures for Taxation, Law No. 17 of 2000 regarding Income Tax and Law No. 18 of 2000 regarding Value-Added Tax. As once stated by Schneider & Ernste (2000), the complexity of tax system and tax burden will motivate people to practice shadow economy. At that time, especially as post-crisis situation was just started to get better, new regulation on tax had burdened the people, hence their attempt to hide their economic activity to avoid tax.

The same situation re-occurred in 2008, when shadow economy increased to 45.2 percent. It was a period of global crisis and Indonesia had just introduced a new tax regulation, namely Law No. 28 of 2007 regarding General Provisions and Procedures for Taxation. This was enough to cause a 3.6 percent jump on shadow economy from the previous year.

The next aim of this paper is to investigate the impact of the quality of human capital on shadow economy in Indonesia. We used the estimated shadow economy (Y_H) as the dependent variable, and life expectancy (AHH), Gross Enrollment Ratio in primary (APK1), secondary (APK2) and tertiary education levels (APK3) as independent variables. Using significance level of 5 percent, those variables are stationary at first difference, therefore the model will be estimated at first difference. The model generated is as follows:

$$\widehat{d(Y_{Ht})} = b_0 + b_1d(AHH_t) + b_2d(APK1_t) + b_3d(APK2_t) + b_4d(APK3_t) + e_t \quad (9)$$

Table 2. The Results of the Human Capital Quality Model

Variables (1)	Coefficients (2)	Probability (3)
Constant	924,026.5413	0.0009
d(AHH)	-2,712,408.9316	0.0018
d(APK1)	3,757.9505	0.9262
d(APK2)	-25,856.9060	0.3554
d(APK3)	133,433.9840	0.0328
R-squared	0.4603	
Prob(F-statistic)	0.0013	

This model fulfils all the assumptions needed at significance level of 5 percent. The adjusted R-square is 46 percent, showing that the independent variables altogether explain the changes in shadow economy as much as 46 percent, while the rest is explained by other variables not used in this model.

Observed from the model, 2 independent variables are proven significant at significance level of 5 percent, namely life expectancy (AHH) and Gross Enrollment Ratio in tertiary education levels (APK3). Meanwhile, Gross Enrollment Ratio for primary and

secondary education levels cannot be proven significant with the data used in this model. Therefore, only the impact of AHH and APK3 on shadow economy will be discussed further.

According to Renooy (in Buehn & Farzanegan 2013, p. 2), there are 2 factors that motivate shadow economy, namely structural and opportunity factors. The structural factor represents external factor of disturbance to enter formal sectors, such as job opportunities, tax corruption, etc. Meanwhile, the opportunity factor represents internal factor of disturbance to enter formal sectors, such as education, skills, lifestyle, culture, value, etc. This opportunity factor reflects the role of character and the quality of human capital in shadow economy level. Supposing the quality of human capital in a country is good, they will have the competence and higher chance to enter labor market in formal sectors and/or higher tax morale and possibility to report their economic activities.

Based on the model, we can observe that changes in life expectancy (AHH) have a negative impact on changes in shadow economy. When changes in life expectancy increase, changes in shadow economy will, in the other hand, decrease. Therefore, it can be concluded that the quality of human capital from health dimension, represented by life expectancy in this study, has a negative impact on shadow economy or can reduce shadow economy in Indonesia. This is because a good quality in human capital from health dimension will increase the opportunity factor, as stated by Renooy.

The higher life expectancy of human capital indicates the longer lifetime they will have and therefore more opportunities to enter formal sectors. The healthier human capital also means that they are more likely to be accepted in the formal sector. Many companies and employers take health condition into account or even put it as requirements for their prospective labors or workers. Therefore, better health will increase the opportunity to enter the formal sector and in perspective causes the level of shadow economy to be suppressed.

The education dimension, however, does not prove to be able to suppress shadow economy level in Indonesia. We learn from the model that changes in gross enrollment ratio for primary and secondary education level (APK1 and APK2) do not prove to have a significant impact on changes in shadow economy. Instead, changes in gross enrollment for tertiary education level (APK3) is proven to have a positive impact on changes in shadow economy, meaning that an increase in changes in gross enrollment for tertiary education level will also increase changes in shadow economy. In other words, the improvement in gross enrollment for tertiary education will cause shadow economy in Indonesia to be higher rather than reducing it.

This situation can happen in Indonesia, because even though higher education level can increase the opportunity of an individual to enter the formal sectors, there is still a structural factor hindering this, such as the lack of job opportunities in formal sectors. Thus, even though the existing human capital can meet the education requirements to enter the formal sectors, the available jobs are simply insufficient to accommodate all the workers.

According to Statistics Indonesia (*Badan Pusat Statistik* or BPS), there are 1.29 million listed jobseekers while there are only 0.63 million listed jobs in 2012. Meanwhile in 2013, there are 1.05 million listed job seekers and only 0.61 million listed jobs, resulting in employment rate of only 62.7 percent by August. In 2014, there are 1.29 million listed jobseekers and 0.82 million listed jobs with 62.6 percent employment rate by August, slightly lower than in previous year. From this data, we can conclude that one of the problem in Indonesia is that the job opportunities listed are simply inadequate to accommodate all the listed jobseekers. Therefore, it is only natural for the unemployed to turn and conduct informal activities to survive.

However, the job opportunity must not only be sufficient in terms of quantity, but also has to satisfy in terms of intellectuality and compensation. The higher the education level of the human capital, the higher their expectation to obtain a job that is in

accordance to their education level and can provide good compensation. Supposing the jobs available cannot meet their expectations or in other words the available human capital is overqualified for the jobs, they will be more interested to conduct economy activities in shadow economy that they may find more rewarding in terms of compensation and challenging their intellectuality or passion, for example establishing home-industry or taking part-time projects.

According to International Labor Organization (ILO) in "Labor and Social Trends in Indonesia" (2014–2015), unemployment case in Indonesia is partly due to a mismatch between the skills and education of the listed jobseekers and the listed job opportunities. International Labour Organization (2014) discovers that jobs such as clerks and administrative staffs in offices, that will only need secondary level of education, are filled by workers with tertiary level of education (university or higher). In fact, 39.1 percent of workers in that fields are classified overqualified. Meanwhile, basic jobs that only require basic skills and can be filled by those with primary education level background have approximately 22 percent overqualified workers. In total, there are 7 percent of workers by August 2014 in Indonesia that are classified as overqualified for their job, while 56 percent are not eligible. In terms of salary and wage, according to International Labor Organization (2015a,b), there are a great number of workers in Indonesia that receive low wages or even underpaid.

Therefore, based on the results of this study, to suppress shadow economy level in Indonesia, we can try to improve the quality of human capital in terms of health. Meanwhile, improving the quality of human capital in terms of education, in this study, has not been proven to be able to reduce shadow economy level and instead several variables are proven to increase it. This might be caused by the lack of structural factor such as the lack of job opportunities as well as the quality of educational system and political institutions. A further study will be necessary to observe the impact of the structural factor.

5. Conclusion and Recommendation

Based on the results and discussion of this study, there are several important points to conclude. Using the currency demand approach, we discover that the estimated size of shadow economy in Indonesia from 1981 to 2014 in average is 28.97 percent with an upward trend that reaches 43.6 percent in 2014. This number is considered high in terms of huge potential tax loss, yet quite normal among developing countries.

Referring to the 2nd model, we discover that the quality of human capital plays a role in the growth of shadow economy, indicating its potential to decrease shadow economy level in Indonesia. According to the model, changes in life expectancy (AHH) show a significant and negative impact on changes in shadow economy. The higher the life expectancy, the higher the chance for an individual to enter the formal sector during their lifetime. Higher life expectancy also shows a better overall health quality of human capital in Indonesia, implying higher chance for them to be accepted in formal sectors that mostly consider health for employment as well. Supposing being accepted in formal sectors is easier to achieve, there will be less people preferring shadow economic activities.

However, the 2nd model shows a significant and positive impact from changes in gross enrollment ratio in tertiary education level (APK3), while the impact of changes in primary and secondary levels is not proven significant by the data used in the model. We can conclude that the quality of human capital from education dimension, especially primary and secondary level, is not proven to have a significant impact on shadow economy in Indonesia. However, at tertiary level, it can instead increase shadow economy level in Indonesia. It is possible due to the lack of working fields provided in formal sectors, especially for higher education graduates. Higher education graduates tend to have higher expectation on the jobs and fields they should work

for and the income level that they should obtain. Supposing the jobs provided for the labor market do not meet their expectation, they might prefer to start their own business, mostly starting with low capital, micro-small enterprises, and informal sectors prone to being unrecorded, hence the higher level of shadow economy.

5.1. Suggestions

Based on the aforementioned conclusions, there are some suggestions for the government, in addition to the necessity to conduct a further study or research. The first suggestion is that the government should assess the economic development and performance in Indonesia not only from the recorded economy based on Gross Domestic Product (GDP) but also from the level of shadow economy in Indonesia, since, according to this study, the percentage is quite high. The level of the shadow economy in Indonesia can be a disturbance in national tax income, therefore a plan is needed to detect and suppress it.

The second suggestion is that the government should improve the quality of public health through health programs such as to distribute better medical facilities, equipment and medical workers throughout the nation, to ensure that the public opportunity to enter the formal sectors will also improve, as in this study it is proven to suppress the level of shadow economy. The government should also strive to provide more job opportunities in formal sectors that will be sufficient to absorb the working age group as well as improve the wage and salary condition to ensure that it is more appealing to the more educated working age group instead of dwelling in shadow economic activities.

The third suggestion, particularly for future research regarding this topic, is to consider structural factors and observe how they will impact the level of shadow economy in Indonesia. This can be carried out by using variables such as the number of job opportunities in formal sectors, Indonesia corruption index, the quality index of government

institution, etc. Therefore, we will be able to observe the problems and factors that cause and may impact shadow economy in Indonesia in a more comprehensive way. Another suggestion for future research regarding this topic is to also consider informal educations that will improve the skill of the workers, such as courses and skill development training. This will be interesting to examine and will provide information on how the educational system in Indonesia can be improved.

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